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Indicators of obsolescence of the medical literature in a Mexican pediatric journal

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Abstract

Introduction: *Obsolescence is the decrease of the validity of the information in time and is known as literature aging.* **Objectives:** *To analyze the obsolescence of the literature of original articles published in 10 years in a Mexican pediatric journal.* **Material and Methods:** *Articles published in the Clinical Bulletin of Sonora Children's Hospital (BCHIES) were analyzed. The variables were: year, volume, number, percentage of original articles, reference year, total of references per article, operational and file; articles citations and self-citations, Price Indices, Burton-Kebler and Brookes, half-life, and aging factor.* **Results:** *The 87 original articles (37%) contained 1,726 references, and the average was 19.8 per article; operational references were 398 (23%) and the file references, 1,287 (74.5%). There were 30 (34.4%) citations to articles, and self-citations were 19 (21%), half-life, 13.2 years; the aging factor was 0.86, the annual loss of income was 14%.* **Conclusions:** *The percentage of original articles from the BCHIES is close to 40%, likely to improve, and in the literature archive, the aging factor reversed.* (Gac Med Mex. 2016;152:181-5)

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Introduction

Bibliographic citations, in addition to being relevant for the creation of an original scientific article, constitute the foundation on which previously expressed knowledge on the subject is based, favor the discussion and comments, and allow for new experiences to be compared an added. Their analysis helps to know indicators that bring the quality of a publication to light. Bibliometric research studies allow for both bibliographic sciences scholars and medical researchers to know the usefulness of contributions to knowledge and the way these are weighted.

Bibliometrics enables for a quantitative analysis of the scientific production to be made by studying the nature and the course of a scientific discipline; it is part of scientometrics and its function is based on applying mathematical and statistical methods to analyze the course of written communication or scientific literature, as well as that of the authors who produce it. To quantify scientific activity through the quantitative treatment given to the properties of written discourse and its behaviors, it is necessary to rely on bibliometric laws,

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which are based on the regular statistical behavior over time. Bibliometric laws can measure the distribution of a given subject and demonstrate the relationship between published works and the author. There are also laws on information growth, on obsolescence and on dispersion, with the latter referring to the study of a given subject and its growth starting from a minor nucleus of journals[1-4].

There are also bibliometric indicators able to analyze the person who publishes, his/her productivity, citations, the contents of his/her contributions and his/her methodological processes. These indicators, which are an instrument to measure publications, allow analyzing the impact of a scientific work, or any other type of work, depending on the quoted literature; they can determine the growth of any area of knowledge, considering the quality and quantity of published works, research centers, impact and citations[4-7].

The study of obsolescence or aging of scientific literature can be classified into diachronic or synchronic. It is diachronic when the resulting value between the year of publication of the documents and the median of received citations is calculated (the median is the year during which 50% of received citations is accumulated); its direction in time is prospective. In the synchronic study, the mean age of the references made in a group of documents published in a particular year is determined; it is the most common measurement and its direction in time is retrospective[1-5].

Publication analysis constitutes a very important process of bibliometric research, since it is a tool that allows for quality to be qualified according to the way knowledge is structured and the impact it has on specific areas. In this regard, there are two types of indicators: activity indicators and impact indicators of a publication. Activity indicators visualize different aspects, such as the real status of a journal in the scientific setting; they look into the number, periodicity, distribution, collaboration, dispersion, obsolescence. Impact indicators are usually based on the number of times an article is cited; the most widely known is the impact factor (IF), although actually it doesn't measure the prestige of the journals where the citation occurs, but the number of times it is cited in a given period (2 years). A large part of Mexican scientific journals have no IF; in fact, almost everyone is included in group 1 of the Quantitative Classification of Scientific Journals of the Ministry of Health, which only requires for them to be registered in one of 19 bibliographic indices[8,9]. Under this circumstances, obsolescence bibliometric indicators become important: Burton-Kebler half-life or semi-period, Brookes aging factor, the age of operative and file references, the Price index and self-citation index[1,2,4].

In medical journals, it is highly infrequent finding manuscripts related to bibliometric research works, but it is possible to find some[8,10,11]. The purpose of this review is to analyze obsolescence in the bibliography of original articles published in the last 10 years in a Mexican pediatric journal of northwestern Mexico, as well as to explore indicators that might inform us on the quality of this publication.

Material and methods

A diachronic and synchronic study was conducted, with literature obsolescence indices of medical publishing material, where original articles published within a 10-year period (from January 2004 to December 2013) in the Clinical Bulletin of the State of Sonora Children's Hospital (BCHIES – *Boletín Clínico del Hospital Infantil del Estado de Sonora),* a peer-reviewed Mexican biomedical biannual journal appearing on April and September, indexed to the Artemisa, Latindex, Lilacs, Periódica UNAM, Medigraphic and Imbiomed system, were reviewed. For its selection, consideration was given to the fact that it had been uninterruptedly published since its initiation (1984), that it had an age of 34 years and that it was classified in group 1 of the Quantitative Classification of Scientific Periodical Journals of the Ministry of Health, and indexed in Latindex as a scientific journal in the area of medicine, in pediatrics[9].

Study variables were the following: publication title, year, volume, number, year of the reference, publishing periodicity, percentage of original articles published, total references per article, elaboration dates, conclusion date or study period of the article published in the references and total citations; additionally, self-citations were reviewed and clinical areas with higher productivity were identified.

To obtain the Price index, the percentage of citations less than 5-year old and older than 5 years was considered. A search was made in Mexican repositories and in scholar Google for articles published the following year or later on the same subject and whether the original article being analyzed was considered among the citations o not and, in case citations were obtained, the type of journal where they were included, if it was national or was included in the CONACYT index of Mexican Journals on Scientific and Technological Research or in the US National Library of Medicine Institute-PubMed. Self-citations of those authors who had subsequently published a work on the same subject in

Table 1. BCHIES original articles and bibliographic references annual distribution during the 2004-2013 decade

Year	Number of original articles	Number of references	Number of references/ article
2004	7	118	16.9
2005	12	238	19.8
2006	8	146	18.25
2007	7	134	19.14
2008	10	198	19.8
2009	7	124	17.7
2010	12	239	19.9
2011	4	126	31.5
2012	10	198	19.8
2013	10	205	20.5
Total	87	1,726	19.8

other journal were quantified. The data were concentrated in Excel worksheets and expressed in tables for the diachronic and synchronic studies[4-7].

As for statistical procedures, aging half-life, rate and factor were obtained, and Brookes' method and the Price index were used, with the respective statistical analyses; for the diachronic study, the guidelines of the *Universidad de Granada,* Spain, were used[7].

Results

In the 10-year period, 87 original articles were published, which contained 1,726 references, with an average of 19.8 references per article. The proportion of original articles for each printed issue ranged from 21 to 53%, with an average of 37% (Table 1).

In all 10 years, only 6 research works were published 5 years after their conclusion. Operative references, i.e., those less than 5-year old, were 398 (23%); file references, with more than 5 years of age, were the majority: 1,287 (74.5%); in addition, 41 references (0.23%) were found with no data on publication year.

Of the 87 original articles from the period of analysis, 30 were cited (34.4%); out of these, 15 were cited between the first and the fourth year after being published and the other 15, five years later; 3 articles were cited in Mexican journals included in PubMed; in total, the number of self-citations was 19 (21%) (Table 2).

The *Hospital Infantil del Estado de Sonora* clinical departments with higher number of publications in the BCHIES were the following: internal medicine with 23 (26.4%); infectology with 15 (17.2%); surgery with 9 (10.3%); nutrition with 6 (6.8%); and other, with diverse areas such as oncology, epidemiology, obstetrics and gynecology, medical education, emergency medicine and neonatology, with a total of 34 (39.0%).

Table 3 shows the operative and file references, with the Price, Burton-Kebler and Brookes indices, accumulated frequencies, half-life, aging rate and aging factor[7,11-14] of the articles.

Discussion

The analysis of bibliographic citations in journals published in our country might allow us to know indicators that would express the quality of the publication and would provide both bibliometrics processes scholars and physicians interested on diffusing their experiences themselves, with standards to know the usefulness of their contributions to scientific knowledge and the way they are weighted; it would be also useful to the members of editorial boards and to the editors themselves to raise the quality of periodical publications. To that end, one of the initial procedures would be precisely to know the proportion of original articles appearing on each issue of the journal. The criteria employed to assess Mexican biomedical journals that are to be included in the Artemisa database (articles on health information published in Mexico) assign a maximum score of 20 points to journals whose content is comprised by more than 65% of original articles per issue, 10 points if 35-65% of articles are original and 0 points if less than 35% are[14]. In the present work, the general average of original articles published in 10 years was 37%; in a nursing journal, in a 5-year review[11], the percentage of original articles was 41.6%; in another, in a 4-year evaluation[12], it was 18%; therefore, according to the above mentioned parameters, the former two would receive counseling to raise the percentage of original articles in their contents and the third one would not be included in the database. It is the duty of the editor and collaborators to try to increase this percentage.

On the other hand, the number of references for each original article is variable, with a maximum of 40 and a minimum of 16 references being recommended, although this is variable, since average records of 25 references are reported per article[5] (in the BCHIES, it was 19.5 per article). Another requirement is that 75% of the article's references must be less than 5 years old, a recommendation that

Table 2. Citations obtained by original articles after being published (BCHIES, 2004-2013)

Year/ publication	Number of original articles	Number of original articles with research conclusion year > 5 years before being published	Cited 1-4 years after being published	Cited more than 5 years after being published
2013	10	2	0	0
2012	10	1	2	0
2011	4	0	0	0
2010	12	1	3	0
2009	7	0	0	0
2008	10	2	1	0
2007	7	0	0	3
2006	8	0	3	6
2005	12	0	4	6
2004	7	0	2	0
Total	87	6	15	15

Table 3. Distribution of original articles references by year in the BCHIES during the 2004-2013 decade

Year	Total references	Operative references	%	File references	%	References without year	%	Half-life	Aging rate	Aging factor
2013	205	37	18%	164	80%	4	2%	11.03	0.82871187	82.87%
2012	198	36	18%	160	81%	2	1%	7.4	0.76447883	76.45%
2011	126	15	12%	107	85%	4	3%	18.43	0.90083319	90.08%
2010	239	60	25%	168	70%	11	5%	7.64	0.76447833	76.45%
2009	124	12	10%	111	89%	1	0.008%	9.47	0.80773782	80.77%
2008	198	58	29%	136	69%	4	2%	9.31	0.80773782	80.77%
2007	134	26	19%	107	80%	1	1%	8.47	0.78342881	78.34%
2006	146	40	27%	104	71%	2	2%	8.75	0.78829557	78.83%
2005	238	83	35%	151	63%	4	2%	6.5	0.72693197	72.69%
2004	118	34	29%	76	64%	8	7%	7.25	0.748777416	74.88%
Total	1,726	401	23%	1,284	74%	41	3%	13.24	0.8604319	86.04%

only will be possible to comply with depending on the subject, since there are areas related to medical sciences that are little explored[1,5,15-20].

Another factor that may contribute to obsolescence is the publication of articles several years after the research was concluded, which makes sense if in the previous period there hasn't been any contribution on the subject. In the BCHIES, in the 10-year period, there were 6 research works that were published 5 years after the investigation was concluded and, out of them, 4 were quoted in the next 1-4 years after being published.

There is no defined figure on the number of articles of a journal that should be used as references by other authors, but the higher it is, more quality will it entail for the journal and, of course, it will contribute to the journal's IF. Up to 25% of published articles are known never to be cited, 55% are cited only once and only 1% receives 50 or more citations, and 20% are self-citations[20]. In

this review, we observed that articles referred to in other national journals were 30 (34%); although the percentage of cited articles accounts for little more than the third part, it is not significant to estimate the impact; on the other hand, the percentage of self-citations is similar or even lower than that referred in other articles[3-5,10,18-20].

In every institution there are clinical departments that stand out for their productivity. In the bibliometric study *Anales Médicos de la Asociación Médica del Centro Médico ABC,* in the 1991-2000 period, the internal medicine, surgery and orthopedics specialties contributed with nearly 50% of published articles; in the case of the *Hospital Infantil del Estado de Sonora,* the internal medicine, infectology and surgery departments stood out in the generation of articles with almost 54%[10,19].

With regard to the proportions the references should maintain, it is convenient to remember that the Price index results from the relationship between operative and total references (operative plus file references). The limit for file literature growth is 22%; at 39% it is considered rapid growth. For operative literature, it should be 75-80%, although general average for all sciences is 50% of this cited literature. Values are different in different branches of knowledge: the highest are physics and chemistry (60-70%), radiology (55-60%), social sciences (40-45%), botany (20%), philology and history (10%). The percentage of file and operative references in the analyzed journal is inversed according to recommended parameters. Another unfavorable aspect is that, in the 10-year period, 41 references were found with no publication year reported, although this happens in other publications as well[5]. It is suggestive of a failure in the manuscript's review and acceptance process, a fact that, once detected, should be noted and corrected.

The aging factor was 0.86, indicating an annual usefulness loss of 14% with regard to the previous year; although we found the limitation of the scarcity of pediatric publications referring to these subjects[1,4,14,20-25] (Table 3).

Conclusions

The percentage of original articles in the BCHIES journal, although not the ideal 50%, is close to 40%, a figure susceptible to be improved. Half-life was 13.2 years, when the recommendable period for medicine-related sciences is 8 years. There is a marked predominance of file literature that must be reverted. It is necessary for the editorial management of the journal to recommend the body of reviewers and editorial board to carefully weight not only the body of the articles, but also the bibliographic citations.

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